UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/537,598	06/06/2005	Johan Paul Linnartz	NL 021217	5023

24737 7590 03/08/2010
PHILIPS INTELLECTUAL PROPERTY & STANDARDS
P.O. BOX 3001
BRIARCLIFF MANOR, NY 10510

EXAMINER	
BOLOURCHI, NADER	
ART UNIT	**PAPER NUMBER**
2611	

MAIL DATE	DELIVERY MODE
03/08/2010	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents
United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450
www.uspto.gov

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/537,598
Filing Date: June 06, 2005
Appellant(s): LINNARTZ, JOHAN PAUL

Edward C. Kwok
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 11/09/2009 appealing from the Office action mailed 9/10/2009.

(1) Real Party in Interest

The statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The Examiner is not aware of any application, patent, appeal or interference number of any other prior and pending appeals, interferences or judicial proceedings, which may be related to, directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

Bottomley (US 5787131 A).

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

> **(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.**

2. Claims 1-8 and 10 are rejected under 35 U.S.C. 102(b) as being anticipated by Bottomley (US 5787131 A).

Regarding claim 1, Bottomley discloses a diversity receiver (Fig. 3; col. 4: lines 48-59) comprising multiple antenna receiving branches ($r_a(n)$ and $r_b(n)$ in Fig. 1 and Fig. 3), each of said multiple antenna receiving braches comprising estimating means for estimating at least a receiving channel parameter, wherein a first estimating means (204, 306 and 302 connected to $r_a(n)$ in Fig. 3) in one branch of the multiple antenna receiving branches ($r_a(n)$ in Fig. 3) is operatively connected to a second estimating means (204, 306 and 302 connected to $r_b(n)$ in Fig. 3) in a further branch of the multiple antenna receiving braches ($r_b(n)$ in Fig. 3) for using at least a part of the channel parameter estimate in the one branch as an aid for estimating at least a receiving channel parameter in the further branch (302 from estimating means of $r_a(n)$ branch is connected to 204 from channel estimating means of $r_b(n)$ in Fig. 3 ; furthermore, 302 from estimating means of $r_b(n)$ branch is connected to 204 from channel estimating means of $r_a(n)$ in Fig. 3; 204 as described in col. 4 – emphasis added:)

A block diagram of an exemplary embodiment of the present invention is given in FIG. 3. Each antenna's received sample stream is provided to a multi-tap channel estimator 302, which models the channel using a plurality of channel taps. One channel tap estimate from each antenna is provided to the weight processor 204. The rest of the channel tap estimates are provided to the impairment correlation processor 306, which computes an impairment correlation matrix using the channel tap estimates. Then, as in FIG. 2, the weight processor 204, the HCMs 208, the summer 210, and the detector 212 are used to form a detected information symbol stream.

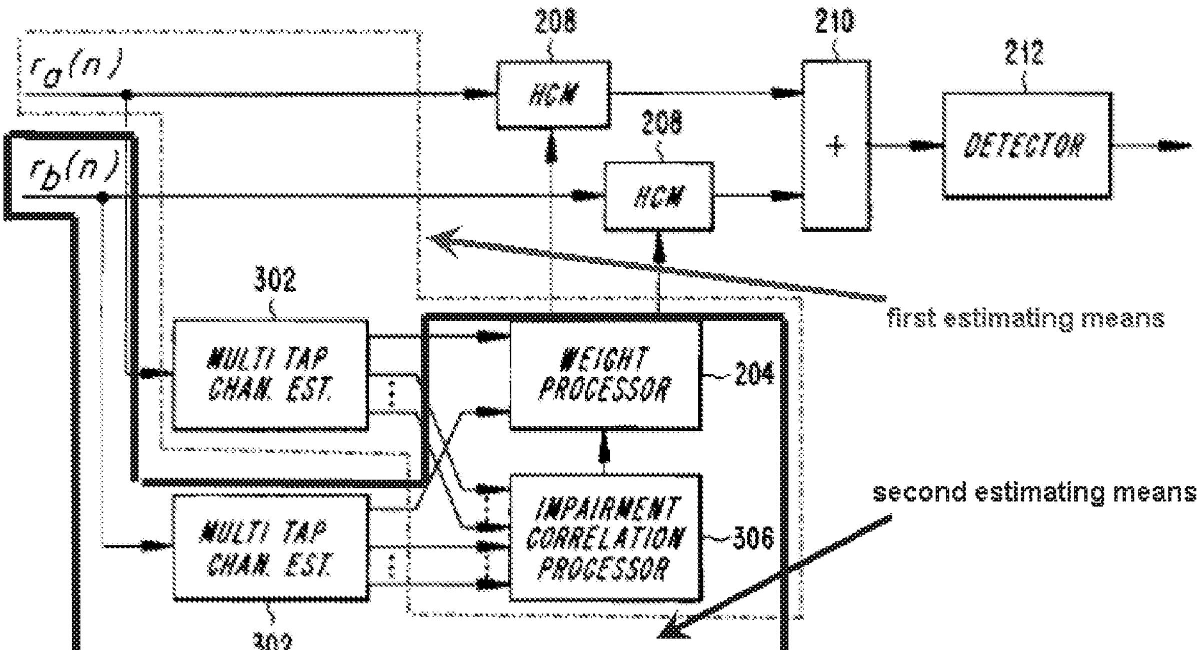

FIG. 3

Therefore, as noted and admitted by the Applicant discussed above, the first and second estimating means have 204 in common (i.e., "operatively connected"), which 204 receives one channel tap from each antenna, as underlined in the extract above

(i.e., “using at least a part of the channel estimation in the one branch as an aid for … in the further branch”).

<u>Regarding claim 2,</u> Bottomley discloses as stated in rejection of claim 1 above. He also discloses the channel parameter estimate in the one branch is used as a starting point for the channel parameter estimate in the further branch (302 from estimating means of $r_a(n)$ branch is connected to 306 from channel estimating means of $r_b(n)$ in Fig. 3 ; furthermore, 302 from estimating means of $r_b(n)$ branch is connected to 306 from channel estimating means of $r_a(n)$ in Fig. 3).

<u>Regarding claim 3,</u> Bottomley discloses as stated in rejection of claim 1 above. He also discloses the channel parameter estimate in the one branch provides a coarse channel parameter estimate (output of 302 from estimation means of $r_a(n)$ branch), and wherein said coarse channel parameter estimate is used as a start for the channel parameter estimate in the further branch (output of 302 from estimation means of $r_a(n)$ branch is input to estimation means of $r_b(n)$ through 204 and 306 in Fig. 3).

<u>Regarding claim 4,</u> Bottomley discloses as stated in rejection of claim 1 above. He also discloses the second estimating means in the further branch is operatively connected to the first estimating means in said one branch for using at least a part of the channel parameter estimate in the further branch as an aid for estimating the receiving parameter channel in said one branch (302 from estimating means of $r_a(n)$ branch is

connected to 306 from channel estimating means of $r_b(n)$ in Fig. 3 ; furthermore, 302 from estimating means of $r_b(n)$ branch is connected to 306 from channel estimating means of $r_a(n)$ in Fig. 3).

Regarding claim 5, Bottomley discloses as stated in rejection of claim 1 above. He also discloses the diversity receiver has two antenna receiving branches ($r_a(n)$ and $r_b(n)$ in Fig. 1 and Fig. 3).

Regarding claim 6, Bottomley discloses as stated in rejection of claim 1 above. He also discloses the diversity receiver is arranged for estimating a time delay between the appearance of a certain channel parameter estimate in the various branches ("delay spread" in col. 1: lines 40-55; "path delay" in col. 4: lines 35-47).

Regarding claim 7, Bottomley discloses as stated in rejection of claim 1 above. He also discloses a mobile radio communication device provided with the diversity receiver ("a digital wireless communication system" in col. 6: lines 38-64)

Regarding claim 8, Bottomley discloses a method for receiving a signal (Fig. 1; Fig. 3; col. 4: lines 48-59) comprising the acts of: receiving the signal through multiple antenna receiving branches ($r_a(n)$ and $r_b(n)$ in Fig. 1 and Fig. 3); in each branch, estimating, using estimating means (one estimating means includes 204, 306 and 302, which are connected to $r_a(n)$, and other estimating means includes 204, 306 and 302, which are

connected to $r_b(n)$ in Fig. 3) parameters about a received channel to form channel estimation results(output estimating means of $r_a(n)$ branch in Fig. 3, which is input of 208 connected to $r_a(n)$; also output estimating means of $r_b(n)$ branch in Fig. 3, which is input of 208 connected to $r_b(n)$); directly exchanging the channel estimation results between a first branch (channel estimation means of $r_a(n)$ branch, which includes 204, 306 and 302 connected to $r_a(n)$ in Fig. 3) of the multiple antenna receiving branches($r_a(n)$ and $r_b(n)$ in Fig. 1 and Fig. 3) and a second branch (channel estimation means of $r_b(n)$ branch, which includes 204, 306 and 302 connected to $r_b(n)$ in Fig. 3)of the multiple antenna receiving branches ($r_a(n)$ and $r_b(n)$ in Fig. 1 and Fig. 3); and using first channel estimation results about a first received channel from the first branch in the estimating means in the second branch as an aid for estimating parameters about a second received channel in the second branch and forming second channel estimation results (302 from estimating means of $r_a(n)$ branch is connected to 306 from channel estimating means of $r_b(n)$ in Fig. 3 ; furthermore, 302 from estimating means of $r_b(n)$ branch is connected to 306 from channel estimating means of $r_a(n)$ in Fig. 3).

Regarding claim 10, Bottomley discloses as stated in rejection of claim 8 above. He also discloses estimating a delay value between a first channel parameter in the first branch and the first channel parameter in the second branch (“delay spread” in col. 1: lines 40-55; “path delay” in col. 4: lines 35-47); and synchronizing estimation in the branches by using the delay value (Examiner notes that the impairment estimator in Fig. 2 can be replaced by a data correlation estimator, which estimate the data correlation

matrix R_{rr} as recited in col. 3: lines 15-34. However, with 2 antennas and 3 channel taps, the aforesaid matrix is nonsingular, and an inverse can be computed as recited in col4: lines 35-47, which is interpreted as estimation using the two rays are synchronized)

(10) Response to Argument

1. <u>Applicants' argument:</u>

In regards to claim 1, Applicant reiterates the limitation of claim 1 (emphasis added):

> Claim 1 includes the limitations "each of said multiple antenna receiving branches comprising estimating means for estimating at least a receiving channel parameter" and "a first estimating means in one branch of the multiple antenna receiving branches is operatively connected to a second estimating means in a further branch of the multiple antenna receiving branches for using at least a part of the channel parameter estimate in the one branch as an aid for estimating at least a receiving channel parameter in the further branch"

Furthermore, in regards to the limitation of claim 8, Applicant merely refers to limitation of claim 1 and states (emphasis added):

> (a similar limitation appears in independent claim 8).

Applicant then argues (emphasis added)

Applicant submits that the Examiner is mistaken. Applicant notes that Bottomley clearly shows separate channel estimators 302 for each of the branches $r_a(n)$ and $r_b(n)$. While Bottomley shows the outputs from these two channel estimators being co-processed in an impairment correlation processor 306 and a weight processor 204 for providing weights for respective half complex multipliers (HCM) 208, the two channel estimators operate independently from each other.

Examiner's response:

Examiner respectfully disagrees. Applicant fails to notice that his claimed "a first estimating means" is not merely what Bottomley refers to as "multi-tap channel estimator 302" as shown in Fig. 3. Such interpretation is improper because it is not aligned with what Applicant discloses as "the channel parameter estimating means 6 and 7" in pages 3 and 4 of Specification, and shows in Fig. 1: (emphasis added):

means, all as generally known in the relevant art. For example from the RF means 2 and 3 one or more signals are fed to inputs 4 and 5 respectively of channel parameter estimating means 6 and 7 respectively, in order to allow these means 6 and 7 to derive therefrom respective channel parameter quantities on outputs 8 and 9 respectively. Examples of channel parameters are for example the quality of received signals in one or more channels, or the channel transfer functions e.g. amplitudes and phases of each receiving channel in each branch. The channel parameter estimating means 6 and 7 can --at wish also- derive the respective parameter signals from outputs 10 and 11 of the RF means 2 and 3. For example the quality parameters may even be derived from data signals provided by output signals from hard limiters 12 and 13, as shown by dashed lines in the Fig. The channel parameter signals on the outputs 8 and 9 each comprise a measure for the estimate of the received signal in that particular receiving channel of the branches B1, B2 concerned. When the parameter concerns the channel quality such quality may be the common Received Signal Strength Indication, or shortly RRSI. Another example concerns checksums, used in certain cases in a Digital Enhanced Cordless Telecommunication (DECT) systems. The quality measurement

"equal gain combining". As described above another example of a channel parameter is the channel transfer function. Like the quality parameter the channel transfer function parameter calculation results may at least partly be exchanged between the channel parameter means 6 and 7. Possibly both the quality parameters and the channel transfer parameters may be exchanged in order to reduce the total amount of calculations for selecting the best antenna A1 or A2.

As underlined above, the claimed "parameter estimating means 6 and 7" provides what applicant describes as "respective channel parameter quantities on outputs 8 and 9 respectively", and not just "channel tap estimates". Therefore, "parameter estimating means 6 and 7" are not just equivalent of "multi-tap channel estimator 302" as shown in Fig. 3 of Bottomley. This means that outputs 8 and 9 are not each simply a "channel tap estimates" as the outputs of 302 are; rather the outputs 8 and 9 are equivalent of

outputs of “weight processor 204”. In fact, the claimed “a first estimating means” is equivalent to three components of Fig. 3, i.e., 204, 306 and 302, which are connected to $r_a(n)$; and the claimed “a second estimating means” is equivalent to three components of Fig. 3, i.e., 204, 306 and 302, which are connected to $r_b(n)$, as disclosed by Bottomley and shown Fig. 3 (emphasis added):

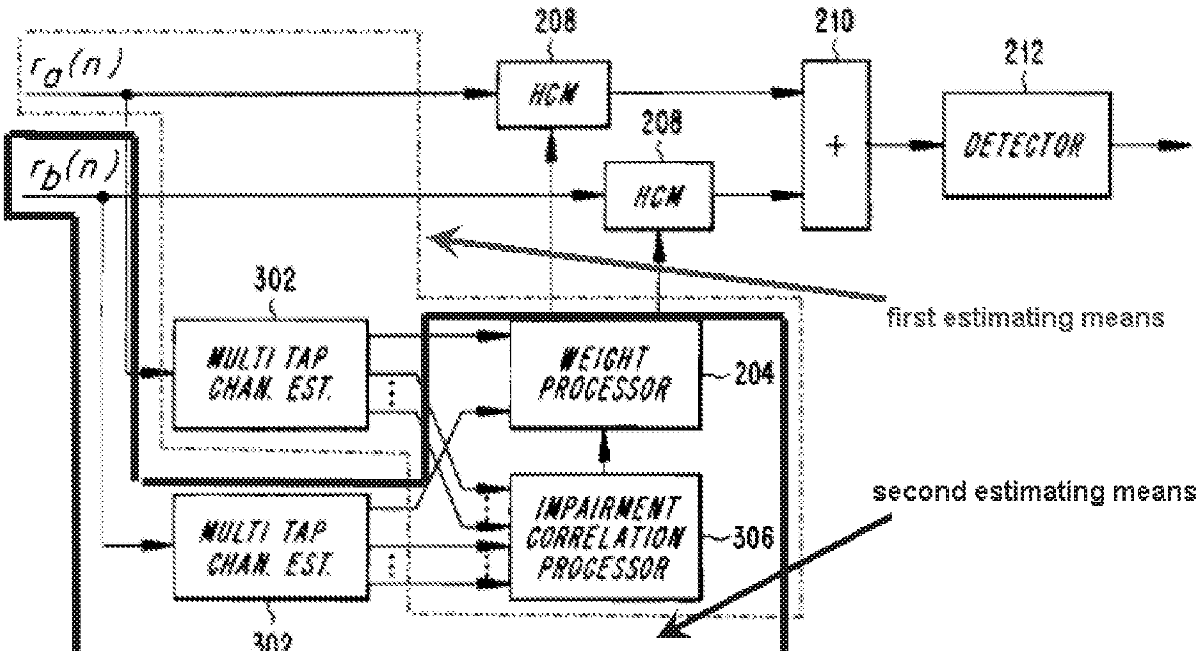

FIG. 3

A block diagram of an exemplary embodiment of the present invention is given in FIG. 3. Each antenna's received sample stream is provided to a multi-tap channel estimator 302, which models the channel using a plurality of channel taps. One channel tap estimate from each antenna is provided to the weight processor 204. The rest of the channel tap estimates are provided to the impairment correlation processor 306, which computes an impairment correlation matrix using the channel tap estimates. Then, as in FIG. 2, the weight processor 204, the HCMs 208, the summer 210, and the detector 212 are used to form a detected information symbol stream.

2. Applicants' argument:

Applicant then argues (emphasis added)

other. Hence, Applicant submits that there is no disclosure or suggestion of the estimating means in the further branch using at least a part of the channel parameter estimate in the one branch as an aid for estimating at least a receiving channel parameter in the further branch.

In view of the above, Applicant believes that the subject invention, as claimed, is neither anticipated nor rendered obvious by the prior art, and as such, is patentable thereover.

Examiner's response:

Examiner respectfully disagrees. As properly noted and admitted by the Applicant (emphasis added):

Bottomley shows the outputs from these two channel estimators being co-processed in an impairment correlation processor 306 and a weight processor 204 for providing weights for respective half complex multipliers (HCM)

the first and second estimating means have 204 in common, which means they are "operatively connected". Furthermore, to generate input to each respective half complex multiplier (HCM), the weight processor 204 receives one channel tap from each antenna, as underlined in the extract above, which means, it is "using at least a part of the channel estimation in the one branch as an aid for estimating at least a receiving channel parameter in the further branch". More specifically, for simplicity using equation (6), we have:

$$\begin{bmatrix} w_a \\ w_b \end{bmatrix} = R_{zz}^{-1} \begin{bmatrix} c_a \\ c_b \end{bmatrix} \tag{6}$$

then, one can use the equation (11)

$$R_{zz} = \begin{bmatrix} |c_a(1)|^2 & c_a(1)c_b^*(1) \\ c_b(1)c_a^*(1) & |c_b(1)|^2 \end{bmatrix} + \begin{bmatrix} |c_a(2)|^2 & c_a(2)c_b^*(2) \\ c_b(2)c_a^*(2) & |c_b(2)|^2 \end{bmatrix} \tag{11}$$

and compute R_{rr}^{-1} . Let's assume:

$$R_{rr}^{-1} = \begin{bmatrix} r_{11} & r_{12} \\ r_{21} & r_{22} \end{bmatrix}$$

Substituting it in equation (6):

$$\begin{bmatrix} w_a \\ w_b \end{bmatrix} = \begin{bmatrix} r_{11} & r_{12} \\ r_{21} & r_{22} \end{bmatrix} \begin{bmatrix} c_a \\ c_b \end{bmatrix}$$

Then doing the matrix multiplication, we get:

$w_a = r_{11}.c_a + r_{12}.c_b$ is output of weight processor in the first estimating means show in Fig. 3 of Bottomley above, which is function of both c_a and c_b, which are the channel tap associated with signals $r_a(n)$ and $r_b(n)$ shown in Fig. 3.

$w_b = r_{21}.c_a + r_{22}.c_b$ is output of weight processor in the second estimating means show in Fig. 3 of Bottomley above, which is function of both c_a and c_b, which are the channel tap associated with signals $r_a(n)$ and $r_b(n)$ shown in Fig. 3.

3. <u>Applicants' argument:</u>

Applicant in page 13, lines 8-21 of Appeal Brief, extracts the Examiner response to his arguments from Final Office Action mailed on 7/8/2009, to contend (emphasis added):

Appellant submits that the Examiner is mistaken. Appellant notes that Bottomley clearly shows separate channel estimators 302 for each of the branches $r_a(n)$ and $r_b(n)$. While Bottomley shows the outputs from these two channel estimators being co-processed in an impairment correlation processor 306 and a weight processor 204 for If the first estimating means is, connected to $r_a(n)$, 302, 304 and 306, then the output from this first estimating means should be "at least a receiving channel parameter". However, according to Bottomley at col. 4, lines 48-53, the output from this "means" is formed by the weight processor 204, which, at col. 3, lines 8-9, is described as determining "the combined weights, as described in equation (2)." Appellant submits that it should be apparent that the "combined weights" are not "at least a receiving channel parameter". Instead, the two multi-tap channel estimators 302, shown in Fig. 3 of Bottomley, correspond to the first and second estimating means of the subject invention in that they do form "at least a receiving channel parameter". However, the two multi-tap channel estimators form their respective channel estimates independently.

Examiner's response:

Examiner respectfully disagrees. Applicant, by arguing Examiner's interpretation of the claimed limitation, fails to comply with 37 CFR 1.111(b) by not specifically pointing out how the language of the claims patentably distinguishes them from the references. As discussed above, Bottomley compute channel tap estimate to estimate the data correlation matrix R_{rr} discussed above, which is used to compute outputs of weight

processor, which are use as an input to the half multiplex multipliers, in order to detect the transmitted signal (emphasis added):

> A block diagram of an exemplary embodiment of the present invention is given in FIG. 3. Each antenna's received sample stream is provided to a multi-tap channel estimator 302, which models the channel using a plurality of channel taps. One channel tap estimate from each antenna is provided to the weight processor 204. The rest of the channel tap estimates are provided to the impairment correlation processor 306, which computes an impairment correlation matrix using the channel tap estimates. Then, as in FIG. 2, the weight processor 204, the HCMs 208, the summer 210, and the detector 212 are used to form a detected information symbol stream.

This is aligned with the Applicant's disclosure as discussed above and indicates that Examiner has properly interpreted the claim limitation "the first estimating means" as three components 302, 204, and 306, which receiving $r_a(n)$, as shown in Fig. 3 by Bottomley (emphasis added):

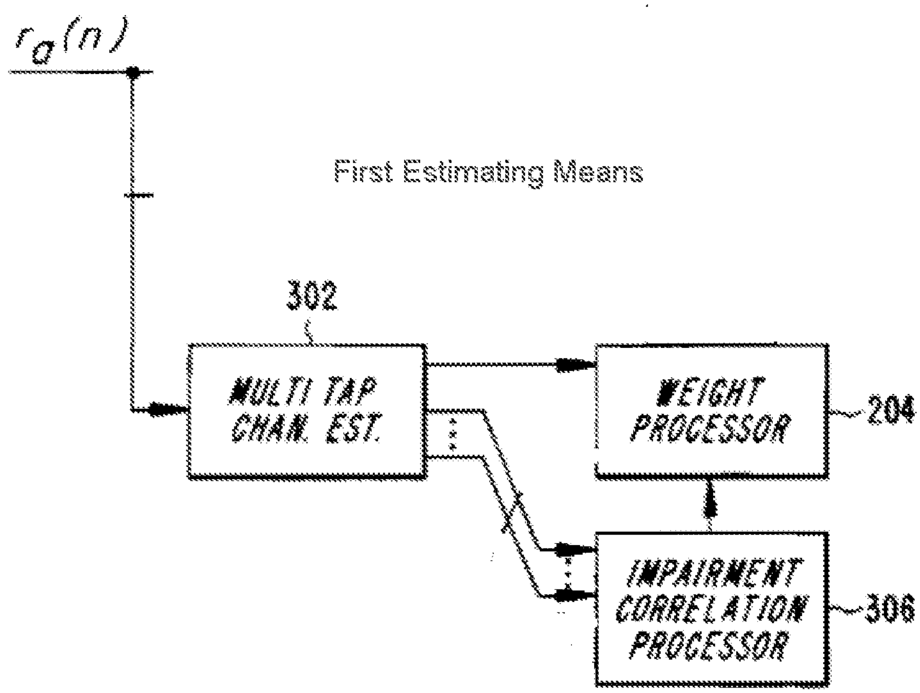

FIG. 3

and Examiner has also properly interpreted the claim limitation "the second estimating means" as three components 302, 204, and 306, which receiving $r_b(n)$, as shown in Fig. 3 by Bottomley (emphasis added):

Second Estimating Means

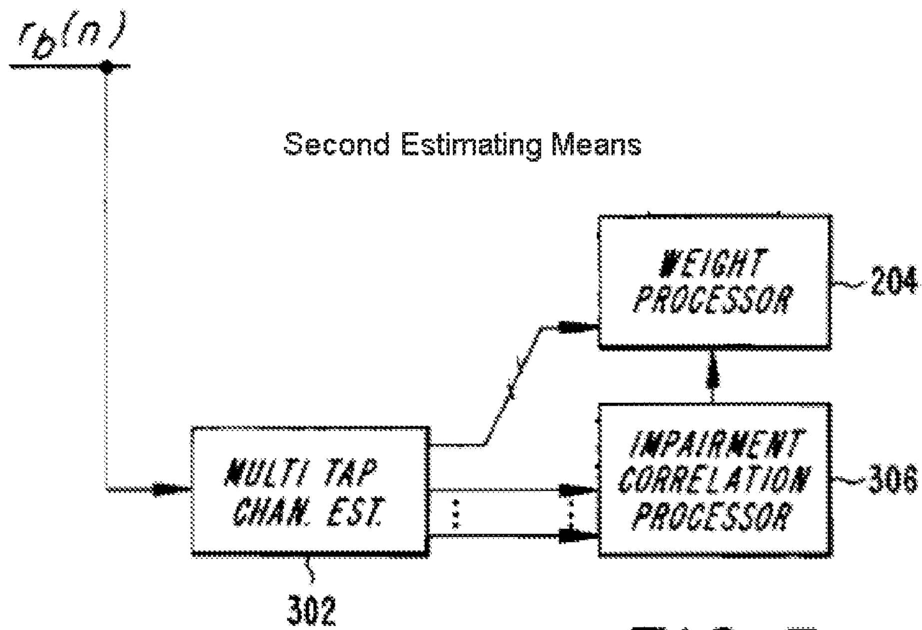

FIG. 3

4. <u>Applicants' argument:</u>

Applicant in page 15, lines 3-13 of Appeal Brief, extracts and paraphrase the Examiner rejection of claim 2 from Final Office Action mailed on 7/8/2009, to contend (emphasis added):

> <u>Appellant submits that this does not make any sense.</u> Where is the "starting point for the channel parameter estimate in the further branch"? <u>It appears that the Examiner is defining the estimating means of both branches as the impairment correlation processor 306 and the weight processor 204, which in combination produce the combined weights applied to the HCM's 208.</u>

In order for the channel parameter estimate to be "the starting point for the channel parameter estimate in the further branch", this channel parameter estimate must at least be applied to the multi-tap channel estimator in the other branch. However, as clearly shown in Bottomley, this is not so. Bottomley only discloses that channel estimates are produced by the multi-tap channel estimators. However, there is no disclosure or suggestion of either of these multi-tap channel estimators using the channel estimate of the other multi-tap channel estimator as a starting point in order to produce the channel parameter estimate.

Examiner's response:

Examiner respectfully disagrees. Examiner has already responded this argument in details under section 2 above. Examiner in rejection of claim 2 recites (emphasis added):

Regarding claim 2, Bottomley discloses as stated in rejection of claim 1 above. He also discloses the channel parameter estimate in the one branch is used as a starting point for the channel parameter estimate in the further branch (302 from estimating means of $r_a(n)$ branch is connected to 306 from channel estimating means of $r_b(n)$ in Fig. 3 ; furthermore, 302 from estimating means of $r_b(n)$ branch is connected to 306 from channel estimating means of $r_a(n)$ in Fig. 3).

What is explained in rejection of claim 2, is clearly depicted in Fig. 3 which has been already discussed in the details above (emphasis added):

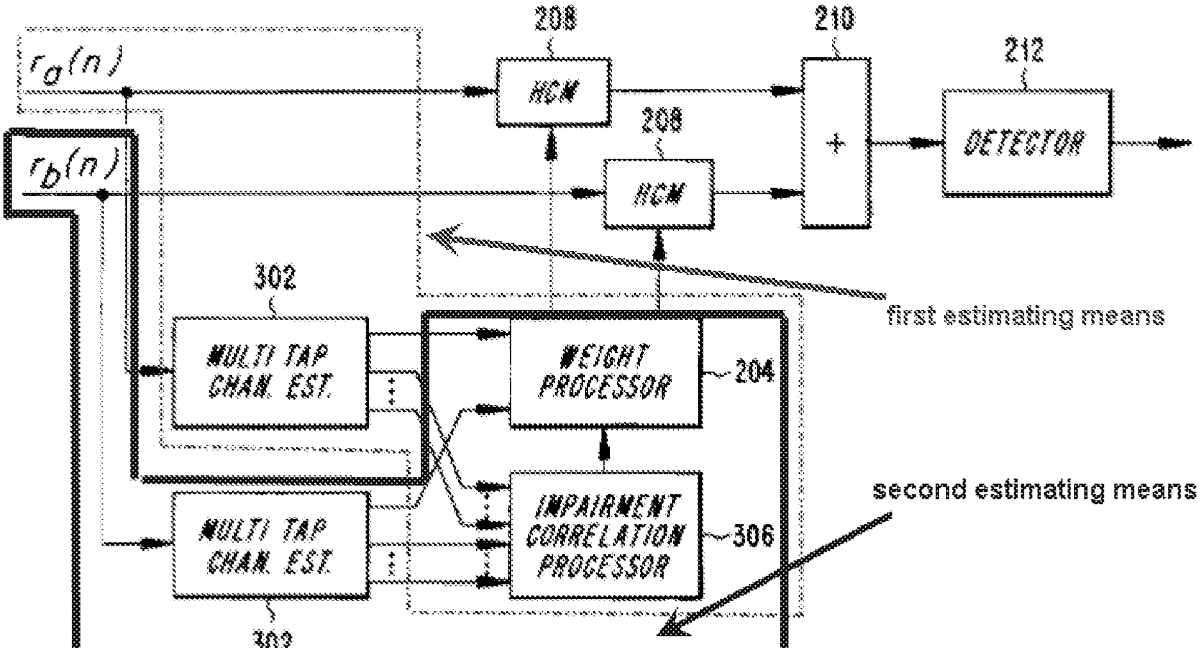

FIG. 3

4. <u>Applicants' argument:</u>

Applicant in page 16, lines 8-20 of Appeal Brief, extracts and paraphrase the Examiner rejection of claim 2 from Final Office Action mailed on 7/8/2009, to contend (emphasis added):

> Appellant first would like to point out that nowhere in Bottomley is there any mention of "coarse channel parameter estimate". Further, <u>the outputs from the "means" 306 and 204 are "combined weights" as clearly set forth by Bottomley, not channel parameter estimates.</u>

<u>Examiner's response:</u>

Examiner respectfully disagrees. As discussed in the details above, Applicant, by arguing Examiner's interpretation of the claimed limitation, provide a narrow

interpretation of the reference and fails to comply with 37 CFR 1.111(b) by not specifically pointing out how the language of the claims patentably distinguishes them from the references.

Examiner has properly interpreted the claim limitation "coarse channel parameter estimate" as recited in rejection of claim 3 (emphasis added):

Regarding claim 3, Bottomley discloses as stated in rejection of claim 1 above. He also discloses the channel parameter estimate in the one branch provides a coarse channel parameter estimate (output of 302 from estimation means of $r_a(n)$ branch), and wherein said coarse channel parameter estimate is used as a start for the channel parameter estimate in the further branch (output of 302 from estimation means of $r_a(n)$ branch is input to estimation means of $r_b(n)$ through 204 and 306 in Fig. 3).

This is aligned with the broad interpration of phrase “coarse” used in the aforesaid limitation.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,
/Nader Bolourchi/
Patent Examiner
Art Unit 2611

Conferees:

/David C. Payne/
Supervisory Patent Examiner, Art Unit 2611

/CHIEH M FAN/
Supervisory Patent Examiner, Art Unit 2611